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THE WELTMANN SERUM COAGULATION
REACTION*

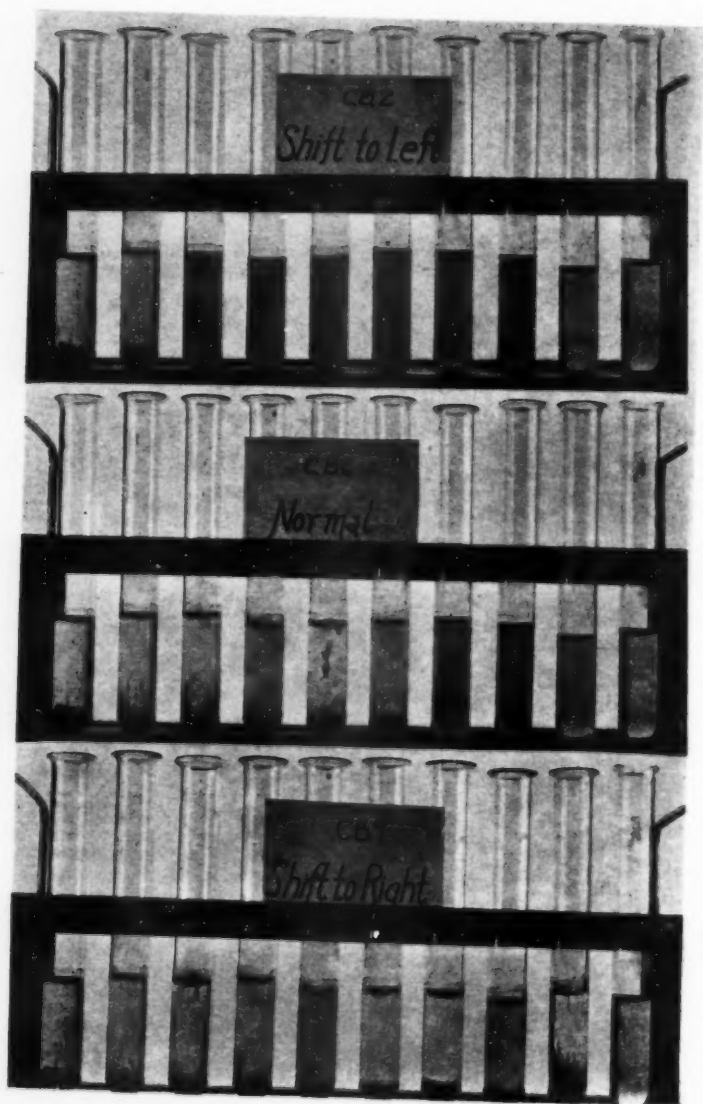
Comparison with the Sedimentation Rate in
1,650 Examinations†

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The Weltmann Serum Coagulation Reaction was presented in 1930, and since that time has been widely used in Europe. Weltmann observed that when blood serum is diluted with distilled water and placed in a boiling water bath, coagulation decreases as the serum concentration becomes more dilute. He carried out investigation with serum, using varying concentrations of calcium, barium, sodium, and other chloride solutions. He noted that with calcium chloride and other solutions giving bivalent cations, complete coagulation occurred in the higher concentrations, the flakes sinking to the bottom leaving a clear supernatant fluid. As the concentrations decreased, the coagulation decreased to a cloudiness, and in the lowest concentrations the fluid remained entirely clear. The technique now in use, which consists of boiling serum in various dilutions of an electrolyte, was perfected, carried out on 400 serum specimens, and reported (13).

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† From the office of Manfred Kraemer, M.D., Newark, N. J.



It is only within the past few years that this test has received application as a diagnostic aid in the United States. For this reason literature in the English language on the subject has, until recently, been limited.

Weltmann Reaction Technique

A stock solution of 0.1% Calcium Chloride ($\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$) is prepared and delivered into test tubes in the following amounts: 5cc; 4.5cc; 4cc; 3.5cc; 3cc; 2.5cc; 2cc; 1.5cc; 1cc; and 0.5cc. Distilled water is added in varying amounts to each of the last nine tubes to make a total volume of 5cc in each tube. The final dilutions are as follows: 0.1% ; 0.09% ; 0.08% ; 0.07% ; 0.06% 0.05% ; 0.04% ; 0.03% 0.02% ; and 0.01%.

Into each tube is pipetted 0.1cc of non-hemolyzed serum. The tubes are shaken and placed in a boiling water bath for exactly fifteen minutes. They are removed and the tubes showing coagulation or flocculation are recorded. In reading, lumping and not turbidity is considered. With the normal specimen, the serum coagulation is complete in the first tube while the fluid clears up, the amount and density of the flocculum diminishing successively from a settled coagulum to a turbidity, which in turn likewise diminishes rapidly.

Since coagulation begins with the highest concentrations of Calcium Chloride, if coagulation is present in the sixth tube, it will also be present in the first five tubes. The results are recorded as the number of tubes in which coagulation has taken place, and are spoken of as the "C.B." or Coagulation Band. A Coagulation Band of 6 to 6.5 was determined as normal by Weltmann and has since been considered as normal by other workers. If coagulation takes place in a lesser number of tubes, the reaction is spoken of as a shift to the left, or a shortened band; in a greater number of tubes, a shift to the right, or lengthened band.

Finkelstein, Lipschutz and Hills in a discussion of the Weltmann Reaction, with application of the test to various types of liver disease, report the normal C.B. value to be 7 to 8. All of the other work previously reported in the literature on this test, as well as the series presented herewith, has shown the normal values to be 6 to 6.5. In the report of Finkelstein et al., every case report recorded showed values higher than those obtained by other workers. It is important

to use accurate dilutions of the electrolyte, and to read carefully the results of this test. It is easy to fall into the error of reading turbidity in the tubes as flocculation. The test should be read immediately following removal from the water bath, and extreme caution must be exercised to read only the number of tubes in which true coagulation has occurred.

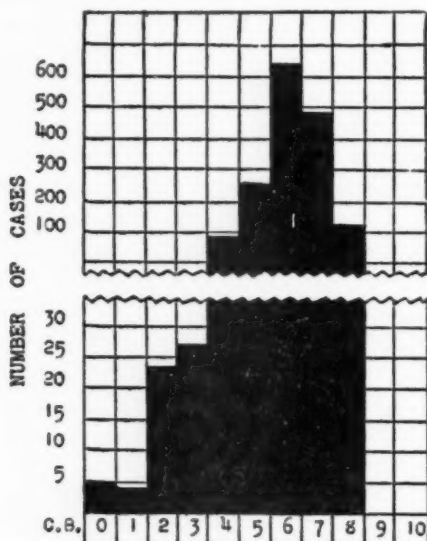


Fig. 1—Range of C.B. in 1,650 cases.

Many theories have been advanced concerning the mechanism of the Weltmann Reaction, among them being differences in the Albumin-Globulin Ratio (9), Serum Proteins (5), the pH (4), and blood Calcium (6). However, Dees (1) conducted experiments which would tend to show that these factors are not the cause of the reaction. She has advanced the opinion that the phenomenon actually takes place because of the Serum Lipids. We have found the blood fatty acids to be low in acute infectious states in which the Coagulation Band is shortened, and elevated in conditions which showed a lengthened Coagulation Band.

Although the test is non-specific, a Coagulation Band of less

than six, and more particularly one of four or less, is evidence of inflammatory or exudative process. A Coagulation Band of more than six or seven is evidence of fibrotic process or parenchymatous liver damage. In cases in which both exudative and fibrotic processes are present, these may balance, resulting in a normal Coagulation Band. For example, in a case from this series, diagnosed as Acute Cholecystitis, the C.B. was 1. In a case diagnosed as Parenchymatous Jaundice (7), the reading as 10. In a case diagnosed as Tuberculosis with both activity and fibrosis (6), the reading was 6.

This coagulation phenomenon has been studied principally in tuberculosis and liver disease, but it has also received application in a variety of disease conditions. The following table lists some of the results of these investigations:

SHORTENED C.B.	LENGTHENED C.B.
Lobar Pneumonia	Obstruction of Bile Ducts
Nephrosis	Chronic Gonorrhea
Acute Nephritis	Chronic Fibrotic Tuberculosis
Amyloid Nephrosis	Bone Tuberculosis
Bronchopneumonia	Congenital Lues
Empyema	Nephrolithiasis
Ulcerative Pulmonary Tuberculosis	Nervous and Mental Disease
Acute Gonorrhea	Chronic Infectious Arthritis
Peritonitis	Blood Destruction
Acute Cholecystitis	Chorea
Coronary Thrombosis	Catarrhal Jaundice
Acute Rheumatic Fever	Leutic Hepatitis
Streptococcal Tonsillitis	Chronic Nephritis
Tuberculous Meningitis	Cardiac Decompensation
Miliary Tuberculosis	Syphilis
Renal Tuberculosis	Amebiasis
Gangrenous Appendicitis	Cirrhosis
Acute Pylonephritis	Acute Yellow Atrophy
Leukemia	Lipoid Dystrophy
Bacillary Dysentery	Purpura
Acute Appendicitis	Fibromyositis
Regional Ileitis	Newborn
Septicemia	Thickened Pleura
Acute Salpingitis	Hyperemesis Gravidarum
Purulent Peritonitis	Lympho-granuloma Inguinale
Tuberculous Pleural Effusion	Sepsis
Tuberculous Peritonitis	Malaria

In this series of 1650 cases, all had extensive physical, labora-

tory, and x-ray examinations, both for the purpose of diagnosis and to check on condition during treatment. The Sedimentation Rate determinations were made by the Cutler Method, and readings at one hour are given in this paper. The Weltmann Coagulation Band readings were obtained by the method outlined.

This series of studies is taken from ambulant cases presenting themselves for diagnostic study and treatment, principally for Gastrointestinal complaints. Figure No. 1 shows the range of the Coagulation Band in these cases. It is particularly interesting to note that no C.B. above 8 was recorded in this series, although the literature records C.B. readings above 6, including those of 9 and 10, in fibrotic tuberculosis (11) and parenchymal liver disease (7). No cases of tuberculosis are included in this series, but 85 cases of parenchymal liver disease gave an average C.B. reading of 6.3. Five cases of cirrhosis of the liver gave an average of 7.2. In view of these findings, it is suggested that a re-evaluation of the lengthened C.B. in parenchymal disease of the liver be made.

As is stated by Kraemer (8), any case showing a C.B. of 4 or less, in which the diagnosis is not self-evident, should be studied extensively. A C.B. of 4 or less is always indicative of infectious or malignant processes, and is never to be ignored. The Sedimentation Rate, on the other hand, is subject to many variables, and our work with the two tests bears out the findings of others (10) (12) that the Weltmann is the more reliable of the two.

A correlation between the average White Blood Count, Sedimentation Rate, and Weltmann Reaction in cases whose C.B. was 3 or less was attempted. These seemed to confirm the findings of Dees (2) that the W.B.C. varied so greatly in various disease conditions in which the coagulation band was shortened, that the correlation was of little significance. The average in 59 cases follows:

C.B.	S.R.	W.B.C.
0	20	10,040
1	25	10,280
2	23	12,250
3	22	13,500

The fact that the average Sedimentation Rate was increased less in those cases whose C.B. showed no coagulation than in those with

coagulation in the first tube, is probably not significant because in this series, only five cases gave a reading of 0, and only four a reading of 1, too few to be of statistical value.

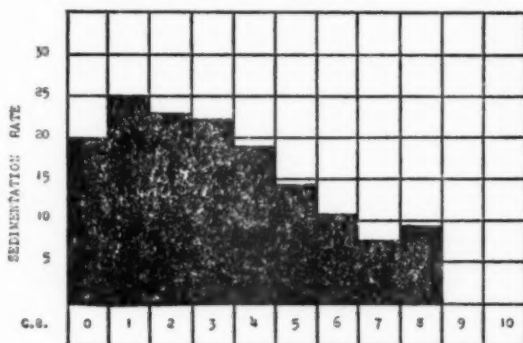


Fig. 2—Average sedimentation rate at each of the C.B. readings.

In the 59 cases showing a coagulation band of 3 or less, the summarized case distribution, according to diagnosis, was as follows:

Diagnosis	Cases
Acute Gastrointestinal Upset	1
Acute Infection*	4
Acute Pulmonary Infection	3
Acute Ulcerative Colitis	6
Appendiceal Abscess	2
Cardiac Conditions	6
Cholecystitis	3
Diverticulitis Coli	6
Gastrointestinal Carcinoma	7
Gastric Ulcer	10
Pyelitis	1
Rheumatoid Arthritis	2
Suppurative Appendicitis	7
Undiagnosed	1

*Other than GI or Pulmonary

Thirty cases of Acute Ulcerative Colitis are included in this series. These showed an average C.B. of 4, and S.R. of 24. In these cases, in analyzing the results of the two tests, the Weltmann seemed to give a more accurate estimation of the condition of the

patient. A lengthening of the C.B. was frequently accompanied by a corresponding decrease in the S.R., but in many cases, for example those showing relapse with subsequent improvement during the course of treatment, the C.B. showed shortening before an increase in the S.R. occurred, and an earlier return toward normal.

Twenty-five cases of Gastric Ulcer gave an average C.B. reading of 5, and S.R. of 14, while eight of these with severe symptoms gave an average C.B. of 4 and S.R. of 18. Here again clinical improvement was reflected first in the Weltmann before there was a decrease in the Sedimentation Rate. During treatment, in a few instances in cases of both Ulcerative Colitis and Gastric Ulcer, there was a marked decrease in the S.R. without a corresponding lengthening in the C.B. However, in each of these cases, the Weltmann gave a more correct estimation of the condition of the patient when evaluated by other diagnostic methods.

Treatment, either Medical or Surgical, with improvement in condition, in many instances showed a marked influence on both tests. For example:

- Case 5298 Diagnosis: Duodenal Ulcer
 9/29/41 C.B. 3 S.R. 19
 10/13/41 C.B. 8 S.R. 8 (after Medical treatment)
- Case 4733 Diagnosis: Carcinoma of Rectum
 6/ 7/40 C.B. 3 S.R. 29
 10/30/40 C.B. 7 S.R. 5 (after resection)

However, progress of a disease condition without improvement frequently showed the Weltmann to be a more reliable indication of the condition of the patient.

- Case 5139 Diagnosis: Duodenal Diverticulitis
 5/15/41 C.B. 5 S.R. 26
 7/ 2/41 C.B. 3 S.R. 18 (unimproved clinically)
- Also, in the course of an acute infection the C.B. may show a shift to the left and return to normal without the S.R. being affected.
- Case 32R Diagnosis: Acute Myocarditis (with changes in ECG)
 6/28/40 C.B. 3 S.R. 4
 11/22/40 C.B. 6 S.R. 3

Determination of the Weltmann Serum Coagulation Reaction

before appendectomy has made it possible to predict accurately the presence or absence of exudation, a left shift invariably indicating acute suppuration, gangrene, or appendiceal abscess. In gastrointestinal disease, quiescent ulcers give a normal C.B. but complications, such as perforation, are immediately apparent in a left shift of the C.B. Since the S.R. gives little information in such instances, the Weltmann Reaction has proven to be of considerable prognostic value.

Our work with the Weltmann Serum Coagulation Reaction has not been so conclusive with regard to the lengthened Coagulation Band. As previously stated, no readings above 8 were obtained. This was a matter of disappointment when the literature records readings of 9 and 10 in such conditions as cirrhosis of the liver, and we were unable to record a reading above 8 in similar cases. All steps in the procedure were carefully checked to see if an error had occurred, but none was found.

In cases diagnosed as parenchymatous liver disease and in conditions with fibrosis, however, we consistently obtained C.B. readings of 6, 7, and 8. Cases such as Acute Ulcerative Colitis which gave readings as low as 2 and 3 when inflammation was present, showed regular lengthening of the C.B. from a left to a right shift as healing with fibrous replacement took place.

We have found right shift readings to be of more value in ruling out the presence of suppuration or exudation than in denoting disease of the liver parenchyma or fibrosis.

Summary and Conclusions

1. The Weltmann Serum Coagulation Reaction is a simple test requiring so little time and equipment that it may be carried out routinely.
2. The Weltmann Reaction is not a specific diagnostic test, but it does denote the presence of suppuration not clinically evident, distinguish septic from non-septic febrile states, and assist in following the course of many diseases. Its principal value lies in differentiating inflammatory or exudative from fibrotic processes or disease of the liver parenchyma.
3. The diagnostic and prognostic value of the Sedimentation Rate is appreciably lowered by the numerous variable factors in-

fluencing the test. The mechanism of the Weltmann Reaction depends upon fewer factors. When the results of the two tests are evaluated, the Weltmann Reaction has been found to more accurately reflect pathologic-anatomic changes. For these reasons, its wider acceptance as a routine laboratory procedure is suggested.

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SOME NOTES ON ANAEROBIC CULTIVATION*

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Since the description of Thioglycollate Medium in 1939 several thousand laboratories have employed it and the author has from time to time received valuable criticism and suggestions relative to its use. It is thought advisable at this time to make these suggestions available together with some recent findings which might be of value to medical technologists.

This medium has recently been approved by the National Institute of Health and the Department of Agriculture as a standard sterility test medium. This fact may be of interest to those persons preparing autogenous vaccines.

Thioglycollate Medium as originally described was prepared by adding to 1000 cc. of infusion broth† the following:

Dextrose (Anhydrous)	10 grams
Sodium Thioglycollate‡	1 "
Agar Agar	0.5 "
Methylene blue	0.002 "

A modification by Linden omits the infusion and substitutes more peptone and adds yeast extract.

Regardless of the basic medium we have recently found it of value to ball-mill together the reducing substances and indicator in the proper proportion. By adding 6.5 grams of this powder to one

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† One which has been found to initiate growth of pathogenic organisms, both spore forming and non-spore forming, in high dilution.

‡ If one prefers, thioglycollate acid may be used instead of the sodium thioglycollate. However, it makes necessary the readjustment of the reaction.

liter of any infusion broth or other liquid medium it is converted into a facultative medium for cultivating both aerobic and anaerobic organisms, provided the basic medium is satisfactory. This powder which we have called "Thioglycollate Supplement" is now available commercially. It has been found advantageous particularly in making comparisons of various basic media in their ability to grow out organisms in high dilution and for comparing various media for blood culture work.

Hitchens⁸ and others have shown that very small numbers of organisms are more likely to grow out in media containing a small amount of agar (a fraction of 1 per cent) than in broth containing no agar. We have found that in thioglycollate medium 0.05% of agar is sufficient and that with larger amounts one may obtain so-called "shadow forms" of agar which interfere with the reading of results when growth is very slight. This is especially true if some calcium salts are present. For this reason one is warned against the use of tap water in the preparation of this medium. In the sterility testing of Alum Toxoid and other turbid products, larger amounts of agar tend to hold the precipitates up, making more difficult the reading of results. In making smears from this medium, it has been found¹⁶ that if the smear is fixed with methyl alcohol rather than heat, a clearer background for differentiation is obtained.

The medium containing dextrose should be autoclaved for twenty minutes at a pressure not exceeding 17 pounds; otherwise, excessive caramelization will occur. On removal from the sterilizer, the medium should be cooled to room temperature (25° C.) before being used, for if it is cooled only to 37° C. and placed in the incubator, the agar will not limit the convection currents sufficiently and the medium will become completely aerobic in about forty-eight hours. The medium should not be stored in the ice-box, since a lower temperature increases the solubility of atmospheric oxygen.

Although the original work on this medium was done with fresh pork infusion broth we have made comparisons of various infusions and find no essential differences except that a liver infusion is slightly better for some of the non-pathogenic anaerobes as pointed out by McClung¹⁵, but is less satisfactory for some of the non-spore forming pathogens.

For convenience the complete dehydrated medium was prepared and described². Such a medium has now been kept for two years and is still satisfactory. It should be stated at this point that the sodium thioglycollate, which is a relatively stable compared with thioglycollic acid, does decompose slowly and only a few months supply should be purchased at one time. However, sodium thioglycollate when incorporated in a finely divided state with dextrose, peptone and meat infusion solids remains stable and after two years exhibits the same reducing power in the medium as when originally prepared. It still maintains the ability to neutralize metallic bacteriostatic agents.

One need not be confined to the complete dehydrated medium or fresh infusion in the preparation of this medium for there are several suitable dehydrated infusions on the market which may be used. Several of the peptones on the market have also been found satisfactory.

A more detailed description of the medium will be found in the Journal of the American Medical Association². For further information concerning the uses of this medium, one is referred to the articles by McClung¹⁴⁻¹⁵ on the use of various infusions as bases for the medium, and to the publication of Marshall, Gunnison and Luxen¹³ on its further use as a sterility test medium. Schaub and Foley¹⁷ have described some uses of the medium in diagnostic bacteriology, and Reid and Bowditch¹⁸ have found it superior to other commonly used media for obtaining positive blood and uterine cultures.

Since we first prepared thioglycollate medium we have attempted to make a solid medium which would grow anaerobes in an ordinary Petri dish and would not require any chemicals or special seals other than those found in the medium itself. We have now prepared an anaerobic agar which is used with a modified Petri dish cover¹⁹. A full description of this agar and technique appears in *Science*, Volume 95, No. 2475, Page 587.

This Petri dish cover, which has been designed to work in combination with a solid medium containing a reducing agent, makes possible the surface cultivation of anaerobes and micro-aerophiles without the use of anaerobe jars, petrolatum seals or chemicals other

than those included in the medium itself.

Any good infusion agar containing a satisfactory reducing agent is poured into the usual Petri dish and allowed to harden. Either a pour or streak plate may be made. After the agar has solidified, the Petri dish cover is replaced by the anaerobic lid (Fig. 1), which is so designed that it touches the agar at the periphery and results in trapping a small amount of air over the surface of the agar. The reducing agent in the medium uses up the oxygen in this small amount of air as an anaerobic condition exists. The glass rim on the lid forms a seal with the moist solidified agar, and no other seal is necessary. If 1 cc. of 1:500 methylene blue is added to each liter of agar to act as an indicator, the reduced center of the media in the dish becomes colorless, while the oxygenated periphery for about 5 mm. remains blue.

A tentative formula for a suitable agar is as follows:

Infusion agar or blood agar base	
(containing 1.5 to 2 per cent agar)	1,000 cc.
Sodium Thioglycollate ¹	2 grams
Dextrose	10 grams
Methylene blue 1 cc. of 1:500 solution	pH 7.5

This agar should be distributed in about 40 cc. amounts if 100 x 15 mm. Petri dishes are used and 25 cc. amounts if 100 x 10 mm. dishes are used. The 40 cc. dishes are more satisfactory and may be incubated longer without drying out. The depth of agar in the dish must be sufficient so that the rim of the anaerobic cover rests on the surface of the agar and not on the Petri dish at any point.

We have found that *Cl. tetani*, *Cl. novyi*, *Cl. septicum* and *Cl. welchii* give good surface colonies in 48 to 72 hours and that the plates may be incubated several days longer without drying out. In most cases the growth was much better than that obtained with the same culture in an anaerobe jar. If an unglazed porcelain top is used in pouring the plates, better isolation of surface colonies will be obtained. To facilitate opening the dish, the cover should be turned slightly to break the agar seal.

¹One gram of sodium formaldehyde sulfoxylate and two grams of sodium thioglycollate seem to give a much quicker reduction.

This technique may be used with the usual agar for obtaining partially anaerobic conditions for the cultivation of micro-aerophiles.

In closing I would like to point out one or two very important mistakes concerning anaerobic cultivation. Although it should be well recognized, many persons report the presence of anaerobes if growth is obtained anaerobically. These persons fail to realize that most all of the bacteria which grow aerobically will grow anaerobically and many of them prefer to grow in the absence of free oxygen. Organisms which are often missed in diagnostic work could be isolated if a medium such as thioglycollate were used. This is especially true of some of the streptococci which after original isolation can be grown aerobically.

In Thioglycollate Medium one should never report the presence of anaerobes simply because growth does not occur in the blue or aerobic portion of the tube, but does occur down in the reduced or anaerobic part.

It is my feeling that no one of you would want to do a half way job of your diagnostic bacteriology and that is exactly what you are doing unless you are providing for anaerobic cultivation as well as aerobic on every specimen you examine bacteriologically.

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TRAINING THE METABOLISM PATIENT TO SUCCESSFUL PERFORMANCE*

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In as much as the special preliminary training of the metabolism patient predetermines to a certain degree the success or failure of the metabolism adventure, it is incumbent upon the technician to use a flexible system of instruction applicable to each and every prospect. Such a system must present a complete exposition of the subjective requirements of the examination as well as explanation of its objective significance.

Although the science of basal metabolism demands for itself the respect accorded formal sciences, it is best presented to the patient in the garb of the informal. Its very formality requires intelligent, logical, and literate treatment through the medium of well chosen diction. For children it should bear a certain analogy to the processes with which they become familiar in their regular class room subjects.

It is the purpose of this paper to offer the technician suggestions in concrete form whereby she can convert each subject to a condition of potential success. There are no short cuts to success in metabolimetry; it is not productive of credible results to place a rubber mouthpiece, to instruct the subject to breathe through his mouth, and thereby to initiate successful performance. Reliable results are obtained by far different measures.

An unbelievable situation still exists in certain places wherein worthless two or three minute tests are allowed to be submitted as legitimate scientific procedures and actually are accepted as indicative of existent conditions.

* Presented at the Annual Convention of the American Society of Medical Technologists, Philadelphia, June 10, 1942.

Each time a patient presents such a graph as evidence of his metabolic status, a surge of inherent opposition impels us to present once more procedures which expose the fallacies of unqualified examinations.

It is no wonder that men who tolerate pseudo-correct results admit that they have no faith in the metabolism examination. We ardently urge them to rescue themselves from such a dead end predicament.

The metabolism operator who fortifies herself against the horde of difficulties that threaten to harass her by adopting the use of a routine system of instruction not only banishes the difficulties but multiplies her successes and eradicates her failures.

Neither logically nor practically can the responsibility for co-operation be laid upon the patient. Co-operation in basal metabolism results from gentle pedagogic coercion, the onus of which lies upon the operator. I mention this only that there may not be any doubt as to where the responsibility lies.

We shall refer to the instruction procedure as the metabolism lesson. The remainder of this paper is devoted to outlining and explaining in both its subjective and objective aspects this preparatory procedure. As far as possible we shall present it in direct discourse in order to simulate an actual presentation.

We assume that one starts prepared to use scientific equipment, that it has been serviced properly, and that the patient is lying comfortably in bed, all other necessary considerations having been taken care of.

It is the duty of every technician to insist that she be provided scientific equipment and to refuse to be handicapped by conditions which invite failure.

The metabolism lesson must be presented completely or partially to each subject according as he is taking a first or subsequent test. The judgment of the operator determines which sections may be omitted. She must not take anything for granted. She must not consider any patient instructed unless she has instructed him herself. Then she must suspect that he has forgotten the important points. The main points must be re-enumerated to him each time he makes a recording.

Preparatory to presenting the metabolism lesson, it proves good psychology to seat oneself beside the bed, to take the pulse, to record the age, to discourse informally with the individual for a few seconds on any contingent subject for the purpose of making him feel at ease, and for the purpose of ascertaining any psychological peculiarity that must be dealt with.

When the subject has become at ease, when he begins to assume a receptive attitude, it is the proper moment at which to slip into the process of instruction. If at any time he begins to show signs of worry or apprehension, it is advisable to drop back for a few seconds to the strain of informality until he appears to have become pacific again.

We shall present the metabolism instruction system in two sections; the first, exposition of the subjective requirements of the examination; and second, explanation of its objective significance.

The former is by far the more important, as it constitutes the routine preparation which must be given to each and every subject. The latter usually is to be omitted, as it applies only to a few individuals, those who present themselves prepared to ask a score of questions. This type of patient usually proves himself a very satisfactory metabolism prospect who often records a practically flawless result. His interest in the subject must not be ignored. We suggest that his questions be answered after he has recorded his graph. Thus no elevation of rate results from burdening his mind with a new train of thought.

The metabolism lesson in direct discourse may be presented as follows:

"Because you have never taken a test, I shall explain to you exactly and minutely what I expect you to do, and how I expect you to do it. Only in this way can I require you to give me a perfect result."

"It is possible for any patient to produce an excellent result and it is very possible for one to trace a very erroneous effect. I shall accept from you no performance short of perfection; wherefore it is obligatory that you listen carefully and remember the important points. None of it is difficult, all as easy as any lesson you ever learned in school."

"The test necessitates that you breathe through your mouth rather than through your nose. The air you breathe is exactly like the air you are breathing now. It has no sinister nor undesirable effect upon you. You remain completely in control of yourself just as you are now. The duration or length of time of your test is fourteen or fifteen minutes."

"First, I shall ask you to find a comfortable position so that throughout the test you can remain physically quiet. You must forget your hands and feet; allow the hands to lie quiet at your side, not on top of your chest. Now you are physically quiet. Remember to remain so in order that you may not be going through the work of lifting a hand or a foot."

"Second, I wish you to become mentally quiet also. To become mentally quiet you must close your eyes and keep them closed."

Unless your patient keeps his eyes closed, he is apt to establish an unnatural rhythm of breathing because he is able to see the rise and fall of the oxygen bell as it responds to the rhythm of his breath strokes. Involuntarily and irresistably his breathing falls into tempo with it. The motion catches his eye and subjects him to its hypnotic power. When he has once established in his mind an unnatural rhythm of breathing, he finds it impossible to shift to the free, easy, normal, and natural one which is correct for him. To return to the normal is as difficult as trying to keep out of step with a march to which he is listening.

"Third, you must keep your lips closed around the rubber piece which I shall fit comfortably to your mouth. You will understand how important this point is when I shall have explained a little more fully the purpose of the test."

"The purpose of the test is to determine how much air you require to sustain you during the period of your lowest consumption. Your high values mean nothing to us. We are interested only in your very lowest. Because we are attempting to determine your very lowest rate of consumption, we must guard against any possible loss of air from leakage into the room. Thus we do not find ourselves in the condition of one who goes about with a hole in his pocket or wallet losing money, yet never knowing how much he lost nor how much he spent. We must know that all of the air taken from the supply was breathed by you, not lost."

"Fourth, you must breathe as naturally, as normally, and as regularly as is possible for mouth breathing. You must not work, nor hurry; you must not lengthen nor shorten any individual breath beyond the length of your average normal nose breath; but you must breathe the same type of breath through your mouth as you would if it were to travel through the nose. Change only the path of the breath, detouring it through the mouth. This is an easy detour which does not necessitate a change of rate, neither speeding, nor slowing."

"This fourth point is important because each instroke of your breath, as is each outstroke also, is recorded accurately upon a chart, exactly as you breathed it. An ideal tracing is obtained when the recorded pen stroke represents your natural, normal breath excursion as it would have appeared on the chart had you taken it through your nose instead of through your mouth."

"This recording may be likened to the old 'push-pull' exercise of penmanship which you once practiced in school. The regular was perfect, the irregular, imperfect. You remember what variations were possible if you deviated from the established rate. You are soon to make your 'push-pulls' with your breathing. Keep them as normal and as regular as is possible."

The suggestions given in discussing point four are especially applicable when working with children. On the other hand, however, they are not to be omitted in the training of adults.

"I have given you four things to remember: To lie quiet, to keep the eyes closed, to keep the lips closed, and to breathe as naturally, normally, and as regularly as is possible for mouth breathing."

"Your result will be perfect. I shall not allow you to record it in any other way. I shall stand quietly beside you to watch your work, to time you, and to remind you in case you forget. Also I shall give you a few practice breaths before you start to be sure that you know exactly what you are to do before you are required to do it."

"My share of the responsibility for the success of your examination ends here. I have given you all the information necessary. Our equipment is the most scientific that can be obtained. I have serviced it to a condition of perfection. Nothing can prevent your making a successful recording. The remainder of the effort lies

completely with you. Remember the four points emphasized."

At this point the mouth piece is comfortably fitted.

"Now you may listen how a mouth breath sounds when I take it. I shall exaggerate mine. You need not exaggerate yours. The breath through the mouth takes the same path it would take if you were to blow out a match or a candle. Listen . . . H . . . H . . . H."

While you hold the nose of your subject, and while you draw an exaggerated audible mouth breath so that he may know how to start mouth breathing, allow him to draw as many practice breaths as he needs to initiate an easy start; and in a subdued tone of voice, reassure him thus:

"Easy! Do not exaggerate! That is correct! Now you are instructed! Your start is very good! Continue so! Do not forget how you are doing it!"

Now you are ready to turn the breath current into the machine, to substitute the nose clip for the thumb and finger hold, adjusting it firmly enough so that it cannot slip off.

It all goes so smoothly you can scarcely believe that your subject is doing so well. He may need a little guidance now and then throughout the test, but his success has been predetermined. He has gotten off to an excellent start and will continue so if you require him to. You have led him into a successful performance. The credit is yours.

One should not expect to obtain a successful Basal Metabolism recording in an abbreviated length of time. I shall not specify any length of time for the test, but leave that to the individual operator. I shall say only that the procedure cannot be hurried.

For at least two consecutive minutes throughout the recording, the leak tester should be applied. This may be done anywhere throughout the test if one suspects that leakage exists. We prefer to apply it about four minutes before the end. Thus the whole length of the recording from start to finish is tested and the last two minutes as yet to be recorded after the removal of the leak tester serve to reveal the graph returning to its predetermined hypotenuse.

One should not expect any patient to conform to any fixed pattern in the graph he is recording. Each should be allowed his own

individuality, being required only to carry out the instructions that have been outlined to him. His graph will be of his own making after his own pattern, not referable to any arbitrary type.

Explanation of the objective significance of the test serves to answer almost any question that the most curious is apt to ask. This section of instruction if required by the individual is better presented after he has completed his recording.

"I shall take a few minutes now to answer the questions you asked me."

"Metabolism is the term used to designate the building up and tearing down processes of the human body."

"Metabolic Rate expresses the speed at which it takes place."

"Basal Rate means the very lowest rate at which it is carried on."

"Estimation of your Basal Metabolic Rate amounts to an estimation of the lowest amount of air required or consumed by you during your period of lowest consumption."

"Your period of lowest consumption is that during complete rest—during complete physical, physiological, and mental inactivity."

"Your Basal Rate is the only rate in which we are interested because it is the only constant rate that you will give. Your high rates cover a wide range. Only your Basal Rate remains constant; that is, of course, all other considerations remaining the same, weight, height, condition of health, etc."

"When we have estimated your lowest rate of oxygen consumption, we have determined your Basal Metabolic Rate. This determination is an index to the functioning power of the thyroid gland."

"We all have thyroid glands, some function normally, others abnormally. If the gland functions normally, it provides the individual the required amount of thyroid secretion necessary to accomplish metabolic processes. If it functions abnormally, it provides either too little or too much."

"If the rate is considerably reduced or elevated, one's condition of health is seriously impaired; wherefore it is a question of very great importance to determine correctly whether one's Basal Metabolic Rate is Normal, High, or Low."

"If one's rate registers normal, we assume that his gland is supplying him properly. If it registers low, we assume that the functioning power of the gland is slowed down or depressed, thereby providing less than the individual requires. Likewise, if one's rate registers above normal, we assume the opposite condition to exist, that the individual is being provided too great a supply."

Throughout the presentation of this procedure we have attempted to utilize all possible factors which contribute substantially toward the successful accomplishment of the desired result, that of reducing the subject by preparatory instruction to a condition of potential success.

These factors may be enumerated as follows: power of suggestion, repetition of significant ideas and explanatory words, emphasis, consideration of the individual's psychological status, appreciative cognizance of the inexperience of the uninitiated, explanation by analogy, and modulation of the voice to a pitch conducive to submissive acquiescence.

ABSTRACTS

CELLOPHANE COVERSLEIPS FOR MICROSCOPIC MOUNTS:

J. V. Prevost, U. S. Naval Med. Bull., vol. XL, No. 3, July, '42, p. 721.

Cellophane coverslip, made from cellophane wrappers of cigarette packs were found to have many advantages over glass ones.

A technique for their use in darkfield preparations is described. The cellophane square is held by coverslip forceps and one edge is brought into contact with the mounted drop. It is then slightly bent with the convexity toward the slide and lowered to contact with the slide. The edges are sealed with petrolatum applied from a 2cc. syringe with a 23-gauge hypodermic needle. Oil may be applied and the examination completed in the usual way.

PROTHROMBIN ESTIMATION: A PROCEDURE AND CLINICAL INTERPRETATIONS: S. Shapiro, B. Sherwin, M. Redish & H. A. Campbell, Proc. Soc. Exp. Biol. & Med., vol. 50, No. 1, May, '42, p. 85.

The technic followed was the modification of Link based on the method of Quick, Stanley-Brown and Bancroft. 4.5 ml. freshly drawn venous blood were added to 0.5 ml. M/10 sodium oxalate. This was centrifuged for clear plasma. The plasma and thromboplastin-calcium chloride mixture were brought to 37°C. and 0.1 ml. plasma was added to 0.2 ml. thromboplastin-calcium chloride mixture and the time required for formation of a fibrin clot was noted.

The test was repeated on a dilution of 1 part plasma with 7 parts 0.85% saline.

The technique using snake venom for thromboplastin is also given but it was found less satisfactory using the diluted plasma.

The difference between prothrombin times of whole and diluted plasma was found to be of more clinical value than either alone. It was found fairly constant in normal individuals. It was prolonged in hypoprothrombinemia and when reduced might indicate hyperprothrombinemia or an excess of anticoagulants.

PROPOSED METHOD FOR THE BACTERIOLOGICAL EXAMINATION OF FLAT SURFACES: W. G. Walter & G. J. Hucker, Am. Jr. Pub. Health, vol. 31, No. 5, May, '41, p. 487.

The authors recommend the "contact plate" method in which a layer of agar adhering to a tin disc is used in contact with the surface to be tested. This disc is kept in a Petri dish. This method was found to consistently give higher counts than the older swab technique using wooden or flexible wire swabs. The stiff wire swab method gave higher counts than the contact plate.

The preparation of the plates is described in detail. The ease of handling makes them convenient for field work.

STUDIES ON STORED BLOOD: FURTHER OBSERVATIONS ON THE EFFECTS OF STORAGE ON ERYTHROCYTES: A. Crosbie & H. Scarborough, Edinburgh Med. Jr., vol. 59, No. 1, Jan., '42, p. 40.

One part of 3.8% sodium citrate was used to 9 parts of blood. Fragility of red cells increased gradually and fairly uniformly until after 25 days of storage, a change of from 0.85% to 0.80% NaCl hemolyzed 50% of the cells.

The admixture of stored blood with the patient's plasma will cause some hemolysis but this will not be great with storage under 30 days.

Spontaneous hemolysis was evident as early as the 10th day of storage and appreciable by the 20th day but, this does not contraindicate transfusing it.

The method advocated causes crenation up to 90-100% but this disappears within the first 10-30 days of storage as the corpuscular volume increases.

The sedimentation rate becomes slower during storage presumably because of the development of spherocytosis.

MEAT EXTRACTIVES AND THE NON-PROTEIN NITROGEN OF THE BLOOD: E. Mylon & M. C. Winternitz, Yale Jr. of Biol. & Med., vol. 14, No. 2, Dec., '41, p. 183.

When dogs were fed raw meat, the blood N.P.N. nearly doubled in 4-12 hrs. and returned to normal within 24 hrs. Boiled meat

from which the extractives had been expressed, gave an N.P.N. rise almost double that of the raw meat and the return to normal took 48 hrs. When the extractives were added to the boiled meat, the rise was comparable to that caused by raw meat with the same return to normal.

Two possible explanations are suggested. The meat extractives may increase the efficiency of N-fraction excretion or may result in better utilization of the protein cleavage products.

SERODIAGNOSIS OF TRICHINOSIS BY MEANS OF COMPLEMENT FIXATION: E. Witebsky, P. Wels & A. Heide, N. Y. State Jr. Med., vol. 42, No. 5, Mar., '42, p. 431.

A complement fixation technique is described. Evidence is cited to show that it is sensitive and specific. Antigen is prepared by boiling watery extracts of dried larvae obtained from infested rabbits. A quantitative adaptation is described by which the antibody titre may be observed.

MEAT-BORNE TYPHOID OUTBREAK IN TENNESSEE: P. H. Duff & A. E. Hardison, Southern Med. Jr., vol. 35, No. 2, Feb., '42, p. 139.

Seven cases of typhoid fever are traced to a head-cheese preparation. In this instance the meat was still obtainable and B. typhosus was isolated from it. The woman who had prepared it was found to be a carrier.

CORRELATION COEFFICIENT BETWEEN BASOPHILIC AGGREGATION TEST AND LEAD IN URINE: S. F. Meek, G. R. Collins and G. C. Harrold, Jr. Ind. Hyg. & Tox., vol. 22, No. 9, Nov., '40, p. 401.

A variation of the dithizone method for lead in urine is given in detail. Urinary excretion values of 0.05 mgs. per litre were found for persons employed in lead-using industries but not exposed to lead. Three random instantaneous specimens in a week were found as satisfactory as 24-hour specimens. This test showed good correlation with the basophilic aggregation values.

THE TUBERCLE BACILLUS IN SPUTUM: WITH SPECIAL REFERENCE TO BRANCHING FORMS: R. A. Hunter, Tubercle, vol. 22, No. 11, Nov., '41, p. 257.

Heretofore complex branching forms of tubercle bacilli had only been reported in cultures of the avian type.

In carrying out this work on sputa, heating was reduced to a minimum and picric acid was used as a counterstain. Exhaustive search was necessary. Plates are given showing the complex branching forms obtained.

These observations are offered as evidence that the tubercle bacillus belongs to the streptotricheae or higher bacteria. The branching forms are thought to occur only in ideal parasitic conditions and the single common form to be the adaptation to inhibitory factors of the host.

ODORS (OSMYLS) AS ALLERGIC AGENTS: E. Urbach, Jr. Allergy, vol. 13, No. 4, May, '42, p. 387.

Osmyls, the minute particles which propagate odor, were shown to act as allergens in some instances. Individuals showed hypersensitivity to the scent of trees and plants when they were not hypersensitive to the pollen. Pollen extract therapy may not be effective in such instances. Desensitization has been accomplished by oral administration of minute doses of the volatile oils which are associated with odor.

TREATMENT OF EPIDEMIC MENINGITIS (CEREBROSPINAL FEVER). RESULTS IN 115 CASES WITH A SPECIAL REFERENCE TO THE FALLACY OF INTRASPINAL THERAPY: C. J. Tripoli, Sou. Med. Jr., vol. 35, No. 5, May, '42, p. 472.

A survey of 97 cases of cerebrospinal fever occurring from Jan., '35 to July, '40 showed that of the 70 cases which received intraspinal therapy 28 died, while of the remaining 26 without intraspinal therapy, only 1 died.

During the following period, July, '40 to Oct., '41, 18 cases occurred in the same hospital. No intraspinal therapy was given and all recovered. No difference was noted following the administration of sulfanilamide, sulfathiazole or sulfapyridine orally.

HYPOPLASTIC CONGENITAL ANEMIA. I Rubell, Jr. *Ped.*, vol. 20, No. 6, June, '42, p. 756.

Report of an anemia with the following findings at age 3 mos.: Hgb. 2.5 gm.; RBC 750,000; WBC 2,500 with 8% segmented cells. There was marked poikilocytosis and anisocytosis. The icterus index was 5 and the van den Bergh showed a negative direct reaction. The fragility test showed a beginning hemolysis at 0.40% and complete at 0.28%. This case was considered a congenital hypoplastic anemia. None of the blood-producing substances were of any value and life was maintained by repeated transfusions. The infant seemed to do very well even at the extremely low levels of Hgb. and RBC. There was no tendency toward hemorrhage and the infant showed remarkable resistance and recuperative powers. The count suddenly began to rise at 21 months and had continued practically normal up to the time of publication. No etiological factor was found.

A RAPID TEST FOR ALBUMIN IN THE URINE: R. H. Goodale & L. A. McClintock, *U. S. Naval Med. Bull.*, vol. XL, No. 3, July, '42, p. 720. ETTT

Smooth filter papers are dipped into a half saturated solution of tartaric acid so that almost half of the paper is impregnated. The other half is dipped into a solution of:

Ammonium hydroxide, 26%	300 grams.
Sulfosalicylic acid	300 grams.
Distilled water, q.s.	1000 cc.

They are spread out and allowed to dry. For the test they are folded as usual and put into a test tube or glass. About 7cc. of specimen is filtered. The tartaric ions react with ammonium sulfosalicylate to form ammonium bitartrate and sulfosalicylic acid which in turn reacts to give the usual precipitate which appears in the filtered portion.

The method was found advantageous in doing a large number of albumin tests. It eliminates nitric acid burns and is especially useful in field units or in other instances where the transportation of liquid chemicals is dangerous.

HYPERNEPHROMA OF THE KIDNEY TERMINATING IN COLON BACILLUS MENINGITIS: H. Rosenfeld, N. Y. State Jr. Med., vol. 42, No. 15, Aug., '42, p. 1490.

Case report of a woman of 64 years admitted with acute kidney symptoms including a shaking chill. Blood culture on that day showed *B. coli*. Patient improved enough to have a nephrectomy 3 days after admission. Three days later she had a severe chill and was believed to be developing bronchopneumonia. Blood cultures were positive for *B. coli*. Two days later rigidity of the neck appeared. Spinal fluid cell count at this time was 3,300 and from then on varied from 820-6,000 and from 95% to all polys. Smears of the fluid did not show bacteria but cultures were persistently positive for *B. coli*.

Sulfanilamide treatment was not effective and the patient expired 15 days after admission.

EFFECTS OF MORPHINE ON THE ELECTROCARDIOGRAM OF MAN: W. W. Pettus, A. J. Geiger & S. T. Grzebien, Yale Jr. Biol. & Med., vol. 14, No. 5, May, '42, p. 493.

Morphine sulfate in $\frac{1}{2}$ grain dose was given hypodermically to 10 normal young adult males and 10 patients with heart disease. Electrocardiograms were taken before administration and at intervals of 45, 90, 150 and 240 minutes following.

Every case gave definite clinical manifestations of morphine. Effects attributable to the morphine were displacement of the pacemaker which occurred in one case and development of premature beats which also occurred only once in the group. Bradycardia was not generally observed.

The authors do not believe that administration of morphine would be likely to cause confusion in the diagnosis of acute myocardial injury by electrocardiography.

A NOTE ON THE SURVIVAL OF TREPONEMA PALLIDUM IN PRESERVED CITRATED HUMAN BLOOD AND PLASMA: J. A. Kolmer, Am. Jr. Syph., Gon. & Ven. Dis., vol. 26, No. 2, Mar., '42, p. 156.

A saline suspension of *T. pallidum* was added to human blood which contained 0.35% sodium citrate as usually used in trans-

fusions, and stored at 4°-6°C. This was injected intratesticularly into rabbits at intervals of 1, 3, 24, 48 and 72 hrs. using 1cc. of the mixture. It was found to be infective after 3, 24 and 48 hrs., but not at 72 hrs. A citrate-plasma-treponeme mixture was found to be infectious 3 hrs. after preparation but not at 24, 48 and 72 hrs. The better results observed in plasma are assumed to be due to the centrifuging. The author suggests that plasma probably becomes negative in approximately 24 hrs. storage.

LATENT LIVER DISEASE IN PERSONS RECOVERED FROM CATARRHAL JAUNDICE AND IN OTHERWISE NORMAL MEDICAL STUDENTS AS REVEALED BY THE BILIRUBIN EXCRETION TEST: A. Kornberg, Jr. Clin. Inves., vol. 21, No. 3, May, '42, p. 299.

Bilirubin was given under basal conditions using 1.5 mgm. per kilogram body weight. Serum bilirubin was determined photo-electrometrically using the method of Malloy and Evelyn. More than 15% retention at 4 hours was regarded as abnormal.

Bromsulphalein excretion, galactose tolerance, cholecystogram, red cell fragility, reticulocyte count, sedimentation rate, urobilin, urobilinogen and vitamin A absorption tests were also run.

Relatively many individuals long recovered from catarrhal jaundice showed an increased retention of bilirubin and symptoms of liver dysfunction. Otherwise healthy young persons exhibited chronic non-hemolytic jaundice much more frequently than heretofore recognized.

The bilirubin excretion test was found to be a reliable and sensitive liver function test.

A SIX-HOUR PREGNANCY TEST: W. J. Salmon, S. H. Geist, A. A. Salmon and I. L. Frank, Jr. Clin. Endocrin., vol. 2, No. 3, March, '42, p. 167.

Three immature rats (wt. 35-45 gm.) are each injected with 2 cc. of the first morning urine and autopsied at the end of 6 hrs. Chorionic gonadotropin causes a marked hyperemia of the ovaries.

All but 1 of 78 pregnant urines gave positive results and 31 known negatives were negative.

A confirmatory 24-hr. test based on proliferation of the vaginal epithelium is also described. The authors do not feel this is necessary as one becomes proficient in reading the 6-hr. test.

BOOK REVIEWS

WAR GASES. By Morris B. Jacobs, Ph.D., Food, Drug and Insecticide Administration, U. S. Dept. of Agriculture 1927, Chemist Department of Health, City of New York, 1928. Formerly Lt. U. S. Chemical Warfare Service Reserve. Interscience Publishers, Inc., New York, N. Y., 1942, Pp. 180. Price \$3.00.

The generally recognized ever present possibility of gassing military and civilian populations renders it essential that all become familiar with the available facts relative to this most important subject.

The author has developed the subject in a most orderly and comprehensive fashion classifying the gases likely to be used in the present conflict, defining terminology relating to the subsequent physiologic classification and discussion of the actual chemicals presented in brief form.

In the final chapter, decontamination is well handled and vital information presented in a manner that all may appreciate. Such data should be most useful to both military and lay persons concerned with the task of defense.

SEROLOGY IN SYPHILIS CONTROL. Principles of Sensitivity and Specificity. By Reuben L. Kahn, M.S., D.Sc., Director of Clinical Laboratories and of Serologic Consultation Service, University of Michigan Hospital; Assistant Professor of Bacteriology and Serology, University of Michigan Medical School; Major, Sanitary Corps Reserve, U. S. Army; Special Consultant, U. S. Public Health Service. The Williams & Wilkins Company, Baltimore, Maryland, 1942, Pp. 206. Price \$3.00.

The distinguished author of the well-known Kahn test has provided in this volume a comprehensive exposition of serology with which subject he has been so long identified. Emphasis on the far reaching importance of serologic tests in control of syphilis is timely since such procedures are no longer restricted to the suspected person. The industrial, public health as well as purely clinical scope of serology attest the necessity of a better under-

standing of the fundamentals involved, hence the author has ably applied his extensive knowledge of the subject in this direction rather than elucidating details of technic.

The bibliography at the end of each chapter, the table of contents and indexing are adequate. The final chapter is unique as well as informative since it features the reports of two conferences on serology in syphilis control which provide a cross section of current views on the subject derived from Public Health, Industrial and other authoritative sources.

THE MEDICAL APPLICATIONS OF THE SHORT WAVE CURRENT, by William Bierman, M.D., Attending Physical Therapist, Mount Sinai Hospital, New York City, Assistant Clinical Professor of Therapeutics, New York University College of Medicine. With a chapter on Physical and Technical Aspects by Myron M. Schwarzschild, M.A., Physicist, Beth Israel Hospital, New York City, Instructor of Physics in Radiology, New York University College of Medicine. The Williams and Wilkins Company, Baltimore, Maryland, 1942, Second Edition, Pp. 344, Price \$5.00.

The first two chapters carefully outline the fundamentals of physics as applied to the short wave current. They are aptly illustrated with schematic drawings which greatly simplify the subject matter. Rather briefly outlined are the practical questions as the selection of equipment, power output, control arrangements and radio interference.

Experimental work is reviewed in which temperature determinations of local areas with both spark gap and tube machines, and coil and cuff technics were done.

The chapter on physiologic responses to local heat and local short wave currents excellently summarizes this field and the information would be of help to both physician and technician.

Specificity of the short wave current is admirably presented and could be read with profit by anyone contemplating changing or buying new equipment.

Part Two of the book takes up the clinical consideration in the technic of preparing the patient, for application of the electrodes, and the determination of dosage. Details are broadly considered in these phases and the experiences of foreign workers is

given. The introduction to the chapters dealing with the application of the various disease entities is a valuable contribution and should be read by anyone contemplating using short wave therapy. It will avert disappointments to the user as it clearly explains why there cannot be a clear cut rule with no exceptions in this form of therapy. The author has impartially stated results and has honestly presented errors in technic so that these may be avoided. The reviewer recommends this book most highly.

BLOOD GROUPING TECHNIC. A MANUAL FOR CLINICIANS, SEROLOGISTS, ANTHROPOLOGISTS AND STUDENTS OF LEGAL AND MILITARY MEDICINE. By Fritz Schiff, M.D., Late Chief of the Department of Bacteriology, Beth Israel Hospital, New York, N. Y., and William C. Boyd, M.D., Associate Professor of Biochemistry, Boston University School of Medicine; Associate Member, Evans Memorial, Massachusetts Memorial Hospitals, Boston. Interscience Publishers, Inc., New York, N. Y., 1942, Pp. 248. Price \$5.00.

As remarked by Dr. Karl Landsteiner in the foreword, Dr. Schiff did not live to witness the publication of this volume. He was long identified, however, with research in this field prior to his becoming a resident of this country. It is fortunate that he had an able collaborator who carried the work to completion.

This volume is as comprehensive in subject matter as its title implies. The fundamentals of blood grouping with explanatory data relating to these phenomena, discussion of blood banks and the status of blood substitutes are particularly pertinent at this time. The treatment of these important subjects is concise, though offered with sufficient elaboration and clarity to provide an adequate guidance for anyone concerned with these procedures.

One of the most valuable assets of this volume for the technical worker is found in the frequent interpretation of false positive reactions and readings of tests. How to do is not always adequate information even for the experienced technician, hence these additional guides to interpretation add much to the value of the treatise.

There are numerous graphs, numerical tables and illustrations supplementing the text. Another notable feature is the informative character of the table of contents which considered with a comprehensive subject index makes for accessibility of the numerous features covered in this volume.

ESSENTIALS OF PATHOLOGY, by Lawrence W. Smith, M.D., Professor of Pathology, Temple University School of Medicine; formerly Assistant Professor of Pathology, Harvard Medical College; and Associate Professor of Pathology, Cornell University Medical School, and Edwin S. Gault, M.D., Associate Professor of Pathology, Temple University School of Medicine. D. Appleton-Century Company, New York, 1942, 2nd Edition, Pp. 960. Price \$10.00.

This new edition of a well regarded initial treatise on general pathology offers a greatly enlarged and rewritten text. It contains 960 pages, 685 figures and 13 color plates. A bibliography has been added and the indexing is adequate.

The three main sub-divisions of the book are general pathology, tumors and systemic pathology. Particular attention has been given to parasitic disorders in which sections are to be found the essentials of classification, morphology, pathogenesis and sufficient general clinical information to appeal to the student, physician or teacher.

Presentation of pertinent case records supplemented with their special and general pathologic considerations, which in numerous instances are well illustrated, not only serve to correlate but emphasizes as well fundamentals of disease processes.

The blank pages for notes, the fine illustrations, frequent cross reference within the text to related subject matter, and the simplicity and clarity of description recommend the second edition of this book particularly to students and practitioners.

NEWS AND ANNOUNCEMENTS

EFFECT OF THE WAR ON MEDICAL TECHNOLOGISTS

As a result of meetings in the East with Army and Navy officials, and as a result of correspondence with various authorities, the Registry of Medical Technologists have assembled the following information:

1. Women Medical Technologists cannot serve as part of the Army or Navy. The Army and Navy are training selected men who have enlisted or have been drafted, to perform the duties of Medical Technologists.

2. A few technologists have been employed by the Government on a Civil Service basis and they have been placed in various Army hospitals; however, their services are being discontinued in many cases, since the Army finds it more desirable to use its own technologists.

3. The Women's Army Auxiliary Corps is not enrolling Medical Technologists because of the attitude of the Army that it would prefer to train its own technologists.

4. There is a definite shortage of qualified technologists to serve in civilian laboratories.

5. The United States Public Health Service is becoming concerned about the conditions which will exist in areas where the population is increasing rapidly because of defense industries and where the medical facilities have not increased to the same extent.

6. In no case does the Army train technologists in civilian institutions.

Announcement of a five year, \$300,000 grant to The Johns Hopkins University, Baltimore, for an intensive and long time study of the disease of infantile paralysis was made July 13, 1942,

by Basil O'Connor, president of the National Foundation for Infantile Paralysis.

This is the largest single grant made by the National Foundation since it was organized in 1938. It will be used to establish and conduct the Center for the Study of Infantile Paralysis and Related Viruses at the Hopkins. The funds which make this and other research projects of the National Foundation possible are contributed each year at the time of the national celebration of the President's birthday.

In announcing the grant, Mr. O'Connor said: "The establishment of this Center at Johns Hopkins is the product of the ideas of many investigators who, after years of research experience in the field of infantile paralysis, keenly felt the need for a Center in which the talents of numerous scientists with widely diverse backgrounds could be pooled in a concentrated attack upon the problems of the disease. In addition to the separate research work of individuals now supported by the National Foundation in leading institutions throughout the country, there has been a need for units in which all the problems of poliomyelitis could be studied on a comprehensive scale and on a long time basis. The Johns Hopkins University offers an ideal place for such a Center, as a large number of the required staff of epidemiologists, virologists, serologists, neurologists and chemists acquainted with the problems presented by poliomyelitis are available there.

"In view of war conditions it is highly desirable, if it can be accomplished without sacrificing defense interests, to keep a nucleus of scientists at work on the problems of infantile paralysis which are so important to human welfare, with the hope that, when peace is established, contemplated expansion in this field may be rapidly consummated."

Work at the Center will be under the direction of Dr. Kenneth F. Maxcy, professor of epidemiology in the School of Hygiene and Public Health. Dr. Maxcy will be assisted by a competent group of scientists, some of whom already have made significant contributions to research in this field.

Three members of this staff already have been appointed and

have begun their work, according to Dr. Maxcy. They are Dr. Howard A. Howe and Dr. David Bodian, formerly of the Department of Anatomy in the Johns Hopkins School of Medicine, and Dr. Robert C. Mellors, a young biochemist from Western Reserve University.

After his graduation from the Johns Hopkins Medical School in 1929, Dr. Howe was appointed instructor in anatomy. He became interested in poliomyelitis research in 1936. Three years later he was joined by Dr. Bodian, who had received the Ph.D. in anatomy in 1934 and the M.D. degree in 1937 at the University of Chicago. Dr. Bodian was a National Research Council Fellow in 1938 and came to Hopkins as a Research Fellow in 1939.

These two investigators have conducted a large number of experimental studies on poliomyelitis as members of the staff of the Department of Anatomy. Their studies recently were collected in book form under the title, "Neural Mechanisms in Poliomyelitis." The investigations reflected in this publication deal mainly with the manner in which the causative virus gains entrance to the body, travels along nerve pathways in the brain and spinal cord, destroying certain kinds of nerve cells while leaving others unscathed. This kind of knowledge is fundamental to an understanding of how to prevent the paralysis that follows so frequently. The newly announced grant from the National Foundation for Infantile Paralysis will permit considerable expansion of work in this field. Other appointments will be made to augment the staff of three already at work.

In setting up the Center, adequate laboratory space and facilities have been provided and resources of the new grant will permit the investigators to carry on their studies in the field as well as in the laboratory as opportunity may be presented. The ultimate objective is to gain a more complete understanding of the spread of the poliomyelitis virus not only within the human body, but in the community, from one individual to another. The mechanism by which it maintains itself in human populations is not yet known. Much additional knowledge is necessary before it will be possible to devise effective measures for the suppression of the disease.

Four additional grants totaling \$20,220.00 for the purpose of

providing scholarships and training in the field of physical therapy—a field very important in the care of infantile paralysis—were announced by Basil O'Connor, President of the National Foundation for Infantile Paralysis, Inc.

The list of awards, including the purposes, the institutions and the amount of each award, follows:

D. T. Watson School of Physiotherapy, Leetsdale, Pennsylvania, \$4,500.00. To provide training in physical therapy for additional students.

The American Physiotherapy Association, Stanford, University, California, \$5,000.00. To provide fifty scholarships for properly qualified students in physical therapy.

School of Health, Stanford University, California, \$6,920.00. To provide training in physical therapy for additional students.

Northwestern University Medical School, Chicago, Illinois, \$3,800.00. To provide training in physical therapy for additional students.

Since last May, the National Foundation for Infantile Paralysis has awarded grants totaling \$347,564.25 to carry on its research and educational programs.

The National Foundation for Infantile Paralysis leads, directs and unifies the fight against infantile paralysis by means of its research, epidemic and educational programs. It also provides medical, nursing and hospital care and orthopedic appliances for needy victims of the disease through its more than 2,400 Chapters.

The funds which made possible the Foundation's programs are raised annually during the various Celebrations of the President's birthday.

EIGHTH ANNUAL MEETING MISSISSIPPI VALLEY MEDICAL SOCIETY, QUINCY, ILL.,

SEPT. 30, OCT. 1, 2

The Eighth Annual Meeting of the Mississippi Valley Medical Society, "The Mid-West's Greatest Intensive Post-Graduate Assembly for General Practitioners," will be held in the Hotel Lin-

coln-Douglas, Quincy, Ill., Sept. 30, Oct. 1, 2. The program will be given by 25 clinician-teachers who will give over 40 lectures, demonstrations, instructional courses, etc. On Sept. 30 there will be a series of instructional courses by Kansas City clinicians and a complimentary stag supper. On Oct. 1, a group of well-known Chicago teachers will have charge. A special Physicians' Sports Event program will be featured on this date with prizes for golf, skeet, bowling, archery and horse-shoes. The banquet will be addressed by Dr. Edward H. Cary, of Dallas, Texas, Past-President of the American Medical Association, and the Presidents of the Illinois, Iowa and Mississippi State Medical Societies. There will be numerous technical and scientific exhibits. Every ethical physician is cordially invited to attend and no registration fee will be charged physicians in the uniform of the armed forces of the United States. The complete program appears in the September issue of the Mississippi Valley Medical Journal, and further information may be secured from the Secretary, Harold Swanberg, M.D., W. C. U. Building, Quincy, Illinois.

